# AM Modulation Review

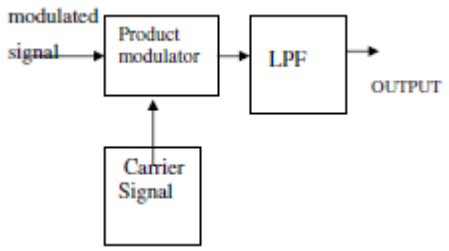
| | |
|---|---|
| 1 | Define modulation?<br>Modulation is a process by which some characteristics of high frequency carrier signal is varied in accordance with the instantaneous value of the modulating signal |
| 2 | What are the types of analog modulation?<br>Amplitude modulation.<br>Angle Modulation<br>1. Frequency modulation<br>2. Phase modulation. |
| 3 | Define depth of modulation.<br>It is defined as the ratio between message amplitude to that of carrier amplitude<br>m=Am/Ac<br>It is also called Modulation factor.<br>Modulation index |
| 4 | What are the degrees of modulation?<br>Under modulation. m<1<br>Critical modulation m=1<br>Over modulation m>1 |
| 5 | What is the need for modulation?<br>_ Ease of transmission<br>_ Multiplexing<br>_ Reduced noise<br>_ Narrow bandwidth<br>_ Frequency assignment<br>_ Reduce the equipment limitations. |
| 6 | What are the types of AM modulators?<br>There are two types of AM modulators.<br>They are: Linear modulators and<br>Non-linear modulators |
| 8 | Give the classification of modulation.<br>There are two types of modulation. They are<br>_ Analog modulation<br>_ Digital modulation<br>Analog modulation is classified as follows<br>_ Continuous wave modulation<br>_ Pulse modulation<br>Continuous wave modulation is classified as:<br>1) Amplitude modulation<br>_ Double side band suppressed carrier<br>_ Single side band suppressed carrier<br>_ Vestigial side band suppressed carri<br>2) Angle modulation<br>_ Frequency modulation<br>_ Phase modulation<br>3)Pulse modulation is classified as follows<br>Pulse amplitude modulation<br>_ Pulse position modulation<br>_ Pulse duration modulation<br>_ Pulse code modulation<br>4) Digital modulation is classified as follows<br>_ Amplitude shift keying<br>_ Phase shift keying<br>_ Frequency shift keying |
| 9 | What is single tone and multi tone modulation?<br>If modulation is performed for a message signal with more than one frequency component then the modulation is called multi tone modulation.<br>If modulation is performed for a message signal with one frequency component then the modulation is called single tone modulation. |
| 10 | Compare AM with DSB-SC and SSB-SC. |

| AM signal | DSB-SC | SSB-SC |
|---|---|---|
| BW=2fm | BW=2fm | BW=2m |
| Contains USB, LSB, carrier | Contains USB,LSB | Contains LSB or USB |
| More power is required for transmission | Power required is less than that of AM | Least Power required |

| | |
|---|---|
| 11 | What are the advantages of VSB-AM?<br>1) It has bandwidth greater than SSB but less than DSB system.<br>2) Power transmission greater than DSB but less than SSB system.<br>3) No low frequency component lost. Hence it avoids phase distortion. |
| 12 | Compare linear and non-linear modulators. |

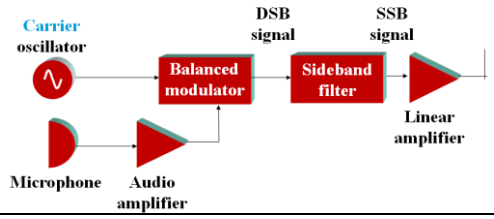
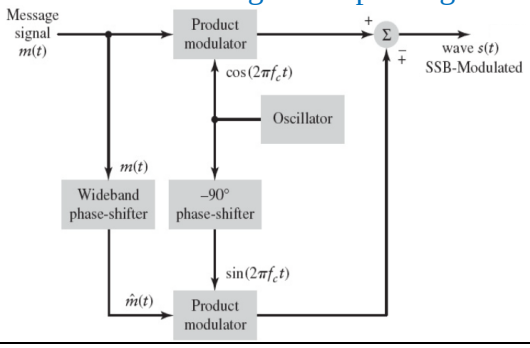
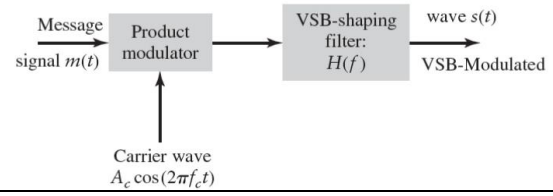
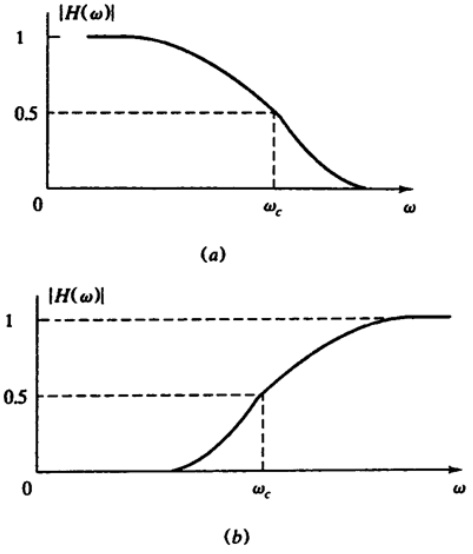
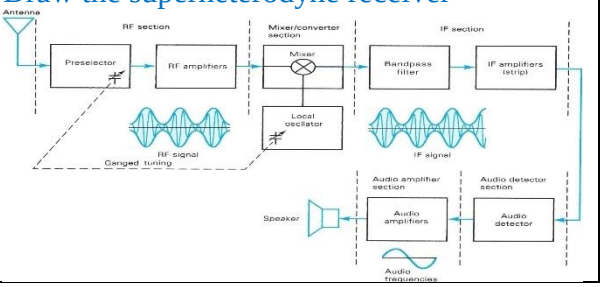
| Linear modulators | Non-linear modu. |
|---|---|
| Heavy filtering is not required | Heavy filtering is required |
| These modulators are used in high level modulation | These modulators are used in low level Modulation. |
| The carrier voltage is very much greater than modulating signal voltage. | The modulating signal voltage is very much greater than the carrier signal voltage. |

| | |
|---|---|
| 13 | How will you generating DSBSC-AM ?<br>There are two ways of generating DSBSC-AM such as<br>1. balanced modulator 2. ring modulators |

| | |
|---|---|
| 14 | Define demodulation.<br>Demodulation or detection is the process by which modulating voltage is recovered from the modulated signal. It is the reverse process of modulation. |
| 15 | What are the types of AM detectors?<br>1. Nonlinear detectors<br>2. Linear detectors |
| 16 | What are the types of linear detectors?<br>1. Synchronous or coherent detector.<br>2 .Envelope or non coherent detector. |
| 17 | Draw the block diagram of coherent detector<br>  |
| 18 | Define multiplexing.<br>Multiplexing is defined as the process of transmitting several message signals simultaneously over a single channel. |
| 19 | Define sensitivity.<br>It is defined as a measure of its ability to receive weak signals. |
| 20 | Define selectivity.<br>Selectivity of a receiver is defined as its ability to select the desired signals among the various signals. |
| 21 | Define stability.<br>It is the ability of the receiver to deliver a constant amount of output for a given a given period of time. |
| 22 | Define super heterodyne principle.<br>It can be defined as the process of operation of modulated waves to obtain similarly modulated waves of different frequency. This process uses a locally generated carrier wave, which determines the change of frequency. |
| 23 | What are the drawbacks of emitter modulator?<br>1. The amplifier is operated in class A mode, thus the efficiency is low.<br>2. The output power is very small. Thus it is not suitable for generating high level modulation. |
| 24 | Define Modulation index and percent modulation for an AM wave. |

| | |
|---|---|
| | Modulation index is a term used to describe the amount of amplitude change present in an AM waveform .<br>Mathematically modulation index is<br>m = Am/Ac<br>Where m = Modulation coefficient<br>Am = Peak change in the amplitude of the output waveform voltage.<br>Ac = Peak amplitude of the unmodulated |
| 25 | Define Heterodyning.<br>Heterodyne means to mix two frequencies together in a nonlinear device<br>or to translate one frequency to another using nonlinear mixing. |
| 26 | What are the disadvantages of double side band full carrier(DSB-FC) system?<br>In conventional AM ,carrier power constitutes two thirds or more of the total transmitted power. This is a major drawback because the carrier contains no information ;the sidebands contain the information .<br>Second ,conventional AM systems utilize twice as much bandwidth as needed with single sideband systems |
| 27 | Define Single sideband suppressed carrier AM (SSB).<br>AM Single sideband suppressed carrier is a form of amplitude modulation in which the carrier is totally suppressed and one of the sidebands removed. |
| 28 | Define AM Vestigial sideband.<br>AM vestigial sideband is a form of amplitude modulation in which the carrier and one complete sideband are transmitted, but only part of the second sideband is transmitted. |
| 29 | What are the advantages of single sideband transmission?<br>The advantages of SSBSC are<br>1) Power conservation: Normally ,with single side band transmission ,only one sideband is transmitted and the carrier is suppressed. So less power is required to produce essentially the same quality signal.<br>2) Bandwidth conservation: Single sideband transmission requires half as much bandwidth as conventional AM double side band transmission. |

| | |
|---|---|
| | 3) Noise reduction: Because a single side band system utilizes half as much bandwidth as conventional AM, the thermal noise power is reduced to half that of a double side band system. |
| 30 | What are the disadvantages of single side band transmission?<br>1. Complex receivers: Single side band systems require more complex and expensive receivers than conventional AM transmission .<br>2. Tuning Difficulties: Single side band receivers require more complex and precise tuning than conventional AM receivers. |
| 31 | Define Low level Modulation.<br>In low level modulation, modulation takes place prior to the output element of the final stage of the transmitter. |
| 32 | Define High level Modulation.<br>In high level modulators, the modulation takes place in the final element of the final stage where the carrier signal is at its maximum amplitude. |
| 33 | What is the advantage of low level modulation?<br>An advantage of low level modulation is that less modulating signal<br>power is required to achieve a high percentage of modulation. |
| 34 | Define image frequency.<br>An image frequency is any frequency other than the selected radio frequency carrier that ,if allowed to enter a receiver and mix with the local oscillator ,will produce a cross product frequency that is equal to the intermediate frequency |
| 35 | What is multiplexing?<br>Multiplexing is the transmission of information from one or more source<br>to one or more destination over the same transmission medium |
| 36 | What are the Methods of Generating SSB?<br>1) Frequency Discrimination (Filtering) Method<br>**2) Phase Discrimination Method**. |
| 37 | Draw the block diagram of SSB generator |

| | |
|---|---|
| |  |
| 38 | Draw the block diagram of phasing method<br>  |
| 39 | Draw the block diagram of VSB modulator<br>  |
| 40 | Draw the VSB filter characteristics<br>  |
| 41 | Draw the superheterodyne receiver<br>  |

.